УДК 004.38
Anastasiia Dziuba[1], Nataliia Zhukova[2]
[1] student of group CST-128 ZNTU
[2] PhD (Philology), assistant professor ZNTU

HOW DO SUPERCOMPUTERS WORK?

When you hear a word “supercomputer”, you probably assume it is a big, fast and loud computer. That is not quite true.

The main difference between a usual computer and a super one is in a way it is processing. The usual ones do only one thing at a time, which is called serial processing, while the super one uses parallel processing. A typical modern supercomputer works much more quickly by splitting problems into pieces and working on many pieces at once.

There are a few various types of supercomputers, too. The ones called “clusters” and the ones called “grids”. Let`s start with the last ones: a grid is a quantity of separate computers in different places which are connected through Internet and work as one computer. As for the other one is just a bunch of computers working as one, stored in the same place, connected by local area network (LAN).

The most common supercomputer operating system used to be Unix, but it's now been superseded by Linux. Since supercomputers generally work on scientific problems, their application programs are sometimes written in traditional scientific programming languages such as Fortran, as well as popular, more modern languages such as C and C++.

Supercomputers are measured in a different way than usual ones are: instead of gigahertz, we use FLOPS, which stands for “floating point operations per second”.

There is a big variety of tasks done using computer: searching the web, writing texts, playing games, etc. But most of computers are not capable for doing high-demanding tasks like forecasting weather or testing new cancer drugs, and that’s when we, or more likely, scientists, need supercomputers. Typically, supercomputers have been used for complex, mathematically intensive scientific problems, including simulating nuclear missile tests, forecasting the weather, simulating the climate, and testing the strength of encryption (computer security codes). In theory, a general-purpose supercomputer can be used for absolutely anything.

As anything in this world, supercomputers have their advantages and drawbacks. The main thing is that supercomputers are really helpful in science: drug tests, all kinds of body examinations, weather and climate prediction, all sorts of mathematical calculations, etc. As for the drawbacks - they are quite obvious: supercomputers require lots of space, energy, money and data. And then we have the overheating problem: your home computer may be raising its temperature, while working, which may be uncomfortable, now imagine how uncomfortable it could be in a place, where a bunch of processors are working to their full potential. Also, there is a big problem with parallel processing: the more processors there are in a supercomputer, the harder it will probably be to work out the problems and to make maximum efficient use of parallel processing. Moreover, there will need to be some sort of centralized management system or coordinator to split the problems, allocate and control the workload between all the different processors, and reassemble the results, which will also carry an overhead.

The main point is that supercomputers are a great value to the scientific purposes, though there are some disadvantages in their usage, which, I am sure, would not even exist in the future.